PRESS BULLETIN 547 *April, 1940*

IMPERIAL MYCOLOGICAL INSTITUTE 22 SEPT. 1941

UNIVERSITY OF FLORIDA
AGRICULTURAL EXPERIMENT STATION
WILMON NEWELL, Director
GAINESVILLE

FLORDO SPRAY

By WILLIAM B. SHIPPY
Associate Plant Pathologist, Florida Experiment Station

Flordo spray is a combination of copper sulfate and soap which possesses the fungicidal properties of the former and the wetting and insecticidal qualities of the latter. It has been evolved by the Florida Experiment Station. During a preliminary experimental period which began in 1931 many combinations of these ingredients were prepared with and without supplementary materials. Many kinds of soap were tested; the soap and bluestone were mixed in different proportions and in different orders of combination. The solutions were applied to plants of various kinds, including ornamental plants, truck crops, grapes and other vines, as well as trees.

These experiments showed that only soaps of low alkalinity were suitable for preparing the spray, that the ratio of soap to copper sulfate (bluestone) must be at least 3 to 1 (by weight), and that the addition of a small amount of ammonia enhanced the physical properties of the spray in many cases. It was found that the finished spray was slightly alkaline, settled out very little on standing, and had no free copper sulfate to cause burning. The spray was found to wet all types of plant growth thoroughly and quickly, and on drying to leave a uniform film of residue which adhered well, caused little discoloration, and gave good protection against fungous diseases. It was further found that the spray, presumably due to its soap content, possessed marked insecticidal properties, killing on contact various soft-bodied pests, including aphids, thrips, and red spiders.

Since Flordo spray was first described in 1937*, no change in the kind or proportion of ingredients has been found necessary. The original formula remains as follows:

	Home Garden Basis 4 gallons	Commercial Basis 100 gallons
Soap (granular or chip form)	6 ounces	10 pounds
Bluestone ("snow" or powder)	1½ ounces	2½ pounds
Strong Ammonia (26-29%)	1½ ounces	1 quart

DESCRIPTION OF INGREDIENTS

Soap.—The kind of soap is very important, for soaps differ greatly in physical and chemical properties. Some soaps dissolve in cold water, others only in hot water. Some are mildly alkaline, others are very caustic. Some are high in soap content; others contain much less, the balance being made up of alkali, silica and other inert ingredients. A number of non-caustic soaps, including some of the familiar brands used in the home, have been found acceptable. For preparing large quantities of spray, certain soaps sold only in wholesale lots have been found preferable from the standpoint of cost, quality and convenience. These are oleate soaps, and because of their low melting point dissolve in cold water and remain in solution after dissolving, thereby permitting the making of a soap concentrate. They may be obtained from fungicide dealers or company distributors in 150 to 200 pound barrels at a cost of 12 to 15¢ per pound. Brands and sources of supply of soaps found acceptable will be supplied on request.

Bluestone.—Ordinary bluestone is satisfactory, though it will be found more convenient to use such fine-ground forms as the "snow" or powder which dissolve quickly in cold water.

Strong Ammonia.—The stronger form of ammonia, containing from 26 to 29 percent of ammonia gas, is required. This may be obtained from fungicide dealers, chemical supply houses, or drugstores at comparatively low cost. All containers must remain sealed or tightly stoppered at all times.

PREPARATION

Home Basis.—Add 6 ounces soap to a quart of water and heat to dissolve. Add additional water to make two gallons.

---

*Press Bulletin 504.

Separately, dissolve 1½ ounces bluestone in two gallons of water (for bluestone solutions use vessels made of glass, clay, wood, or enamelware). Pour the two solutions simultaneously into a third container. Stir briefly; add the ammonia, and again, stir briefly.

Commercial Basis.—Dissolve the soap in advance of using. By using high grade oleate soaps, referred to previously, one may make a concentrate at the rate of about 1 pound of soap per gallon of solution, from which the desired amount of dissolved soap may be measured. Further steps in preparing the spray are as follows:

1. Fill mixing tank or spray tank with water to a point close to final volume required. Start agitator and continue agitation throughout the mixing process.

2. Pour dissolved soap into tank and allow time for thorough mixing with the water.

3. Pour bluestone concentrate (2½ pounds in 3 or 4 gallons water) slowly into tank, or a part at a time, so that only a small amount of bluestone comes in contact with the soap at any one time.

4. Add ammonia and allow time for mixing with other ingredients.

When properly made the spray has a smooth, soapy consistency, forming a thick layer of white soap bubbles when shaken vigorously. The liquid is uniform throughout, containing few or no large particles of any kind. Only a little settling out takes place on standing, and the spray keeps well. Any formation of a waxy curd would likely be due to failure to dissolve the soap completely or insufficient agitation when soap and bluestone solutions are combining.

Low Cost Formula.—For use on vegetable crops and other plants where the amount of noticeable residue is of little or no importance, it has been found possible to obtain greater economy and convenience by using certain low-priced, granular soaps which dissolve satisfactorily (though not completely) in cold water, and because of greater alkalinity, permit elimination of the ammonia. Amount of soap and bluestone used is the same. These soaps are added directly to cold water in the mixing tank and dissolve after several minutes of good agitation. As soon as the soap is dissolved, the bluestone concentrate is added

slowly, the agitator being allowed sufficient time to distribute each portion of bluestone uniformly throughout the soap solution. The above soaps are sold in 120 to 150 pound bags or 200 to 225 pound barrels and cost 7 to 8¢ a pound.

GENERAL CONSIDERATIONS

The importance of good agitation when mixing soap and bluestone solutions cannot be overemphasized. After the spray is once made, agitation may be discontinued if desired. Power-driven agitators are, of course, preferable for mixing large quantities of spray, though hand stirring with a large paddle will serve the purpose.

Flordo should be applied with thoroughness. Frequency of applications will be governed by such factors as nature of the disease, rate of growth of the crop plant and amount of rainfall. Applications at weekly intervals are generally indicated for plants regularly subject to serious foliage diseases, frequent applications being particularly necessary during wet weather or when the plants are growing rapidly. However, occasional applications will suffice in most cases if well timed with respect to weather conditions, formation of new growth, and evidences of disease. Frequent spraying is objectionable in the case of certain ornamental plants because of the amount of conspicuous residue thereby accumulating.